

CLAIMS

1. (Currently Amended) A method for packaging a device, comprising:
 - applying a sacrificial material to the device;
 - applying a layer of structural material adjacent to the sacrificial material, the layer of structural material forming a housing adjacent at least a portion of the sacrificial material;
 - ~~creating one or more apertures in the housing of structural material~~removing portions of the structural material to produce one or more apertures to expose at least a portion of the adjacent sacrificial material, the one or more apertures having a size and shape such that a removing material is able to pass through at least one of the one or more apertures but a protective material cannot pass through the one or more apertures~~during an application of the protective material to the housing;~~
 - removing the sacrificial material, wherein the housing of structural material with one or more apertures remains;
 - depositing the protective material adjacent the housing of structural material overlaying at least one of the one or more apertures in an amount sufficient to substantially close the overlaid one or more apertures without the protective material being deposited on the device or any substrate underlying the housing~~entering the housing sufficiently to interfere with operation of the device;~~
 - and
 - curing the protective material.
2. (Original) The method of Claim 1, wherein the method further comprises:
 - providing a gas atmosphere, wherein the pressure is greater than or equal to 1 Pascal (Pa);
 - and
 - providing a temperature of less than 600° Celsius (C).
3. (Original) The method of Claim 2, wherein the sacrificial material has a higher etch rate than the structural material.
4. (Original) The method of Claim 3, wherein the sacrificial material comprises either a photoresist or a polyimide material.

5. (Previously Presented) The method of Claim 2, wherein the structural material is selected from a group of Silicon Dioxide (SiO_2) and Silicon Nitride (Si_3N_4).

6. (Previously Presented) The method of Claim 1, wherein the step of creating one or more apertures in the housing of structural material comprises use of sputter etching, plasma etching, or ion beam milling.

7. (Previously Presented) The method of Claim 2, wherein the step of removing the sacrificial layer comprises use of chemical etching.

8. (Original) The method of Claim 2, wherein the step of removing the sacrificial layer comprises use of either plasma ashing or plasma etching.

9. (Previously Presented) The method in Claim 2, wherein the step of depositing a protective material comprises wicking the protective material into at least one aperture of the one or more apertures of the housing.

10. (Previously Presented) The method of Claim 2, wherein the step of depositing the protective material comprises applying the protective material to at least a portion of the surface of the housing and allowing the protective material to flow into at least a portion of the one or more apertures in the housing.

11. (Previously Presented) The method of Claim 2, wherein the step of applying a layer of structural material comprises forming a structural layer having a thickness of between about 0.2 microns and about 20 microns.

12. (Original) The method of Claim 2, wherein the step of applying a sacrificial material comprises forming a sacrificial layer having a thickness of between about 0.2 microns and about 10 microns.

13-23. (Canceled)

24. (Currently Amended) A method for packaging a device having at least one movable region, comprising:

forming a housing over the device, the housing having at least one aperture, the at least one aperture having a size and shape such that a removing material is able to pass through the at least one aperture but a protective material cannot pass through the at least one aperture during an application of the protective material to the housing, wherein forming of the housing with at least one aperture further comprises:

applying a sacrificial material to the device;

applying a layer of structural material adjacent the sacrificial material, the layer of structural material forming a housing adjacent to at least a portion of the sacrificial material;

creating the at least one aperture in the housing of structural material to expose at least a portion of the adjacent sacrificial material; and

removing the sacrificial layer, wherein the housing of structural material with at least one aperture remains;

depositing the protective material adjacent at least a portion of the housing, wherein the protective material at least flows into the at least one aperture, sealing the at least one aperture in an amount sufficient to substantially close the at least one aperture without the protective material being deposited on the device or any substrate underlying the housing~~entering the housing sufficiently to interfere with operation of the at least one movable region of the device~~; and

curing the protective material.

25. (Canceled)

26. (Previously Presented) The method of Claim 24, wherein the sacrificial layer has a higher etch rate than the structural material.

27. (Original) The method of Claim 26, wherein the sacrificial material comprises either a photoresist or a polyimide material.

28. (Previously Presented) The method of Claim 24, wherein the structural layer is selected from a group of Silicon Dioxide (SiO_2) and Silicon Nitride (Si_3N_4).

29. (Previously Presented) The method of Claim 24, wherein the step of creating the at least one aperture in the housing of structural material is at least configured to use sputter etching, plasma etching, or ion beam milling.

30. (Previously Presented) The method of Claim 24, wherein the step of removing the sacrificial layer is at least configured to use chemical etching.

31. (Previously Presented) The method of Claim 24, wherein the step of removing the sacrificial layer is at least configured to use plasma ashing or plasma etching.

32. (Previously Presented) The method of Claim 24, wherein the step of applying a structural material comprises forming a structural layer between 0.2 microns and 20 microns thick.

33. (Previously Presented) The method of Claim 24, wherein the step of applying a sacrificial material comprises forming a sacrificial layer between 0.2 microns and 10 microns thick.

34-43. (Canceled)

44. (Currently Amended) A method for packaging a device having at least one movable region, comprising:

determining a shape and size for an aperture, such that a removing material is able to pass through the aperture but a protective material cannot pass through the aperture during an application of the protective material to the housing;

forming a housing over the device, the housing having at least one aperture with the determined size and shape, wherein forming the housing comprises:

applying a sacrificial material to the device;

applying a layer of structural material adjacent the sacrificial material, the layer of structural material forming a housing adjacent at least a portion of the sacrificial material;

creating the at least one aperture in the housing of structural material to expose at least a portion of the adjacent sacrificial material; and

removing the sacrificial layer, wherein the housing of structural material with at least one aperture remains;

depositing the protective material adjacent at least a portion of the housing, wherein the protective material flows at least partially into the at least one aperture, sealing the at least one aperture, and the amount of the protective material is sufficient to substantially close the at least one aperture without the protective material being deposited on the device or any substrate underlying the housing; ~~entering the housing sufficiently to interfere with operation of the at least one movable region of the device~~; and

curing the protective material.

45. (Canceled)

46. (Previously Presented) The method of Claim 44, wherein the sacrificial layer has a higher etch rate than the structural material.

47. (Original) The method of Claim 46, wherein the sacrificial material comprises either a photoresist or a polyimide material.

48. (Previously Presented) The method of Claim 44, wherein the structural layer is selected from a group of Silicon Dioxide (SiO₂) and Silicon Nitride (Si₃N₄).

49. (Previously Presented) The method of Claim 44, wherein the step of creating the at least one aperture is at least configured to use sputter etching, plasma etching, or ion beam milling.

50. (Previously Presented) The method of Claim 44, wherein the step of removing the sacrificial layer is at least configured to use chemical etching.

51. (Previously Presented) The method of Claim 44, wherein the step of removing the sacrificial layer is at least configured to use plasma ashing or plasma etching.

52. (Previously Presented) The method of Claim 44, wherein the step of applying a structural material comprises forming a structural layer between 0.2 microns and 20 microns thick.

53. (Previously Presented) The method of Claim 44, wherein the step of applying a sacrificial material comprises forming a sacrificial layer is between 0.2 microns and 10 microns thick.

54-63. (Canceled)

64. (Currently Amended) A method for packaging a device, comprising:
providing a gas atmosphere at a first pressure, wherein the first pressure is greater than or equal to 1 Pascal (Pa);
providing a first temperature of less than 600° Celsius (C);
forming a housing over the device, the housing having at least one aperture;
forming the shape and size of the at least one aperture, such that a removing material is able to pass through the at least one aperture but a protective material cannot pass through the at least one aperture during an application of the protective material to the housing;
removing a sacrificial material from within the housing through the at least one aperture;
depositing the protective material adjacent to the housing in an amount sufficient to substantially close the at least one aperture without entering the housing sufficiently to interfere with operation of the device, wherein the first pressure and the first temperature are adjustable during the application of the protective material; and
curing the protective material.

65. (Canceled)

66. (Currently Amended) A method for packaging a device having at least one movable region, comprising:

forming a housing over the device, the housing having at least one aperture;

forming the shape and size of the at least one aperture, such that a removing material is able to pass through the at least one aperture but a protective material cannot pass through the at least one aperture during an application of the protective material to the housing;

removing a sacrificial material from within the housing through the at least one aperture;

placing the protective material adjacent to at least a portion of the housing, forming a protective layer on the housing, wherein the protective material extends from at least partially into the at least one aperture in an amount sufficient to substantially close the at least one aperture without the protective material being deposited on the device or any substrate underlying the housing~~entering the housing sufficiently to interfere with operation of the at least one movable region of the device; and~~

allowing or causing the protective layer to harden.

67. (Canceled)

68. (Currently Amended) A method for packaging an electromechanical device, comprising:

applying a sacrificial material to the electromechanical device;

applying a layer of structural material adjacent to the sacrificial material, the layer of structural material forming a housing adjacent at least a portion of the sacrificial material;

creating one or more apertures in the housing of structural material to expose at least a portion of the adjacent sacrificial material, such that a removing material is able to pass through the one or more apertures but a protective material cannot pass through the one or more apertures during an application of the protective material to the housing;

removing the sacrificial layer, wherein the housing of structural material with one or more apertures remains;

depositing the protective material adjacent the housing of structural material overlaying at least one of the one or more apertures of the housing in an amount sufficient to substantially close the one or more apertures without the protective material being deposited on the device or any substrate underlying the housing~~entering the housing sufficiently to interfere with operation of the electromechanical device~~; and

curing the protective material.

69. (Currently Amended) A method for packaging a device having at least one movable region, comprising:

forming a housing over the device, the housing having at least one aperture;

forming the shape and size of the at least one aperture, such that a removing material is able to pass through the aperture but a protective material cannot pass through the at least one aperture during an application of the protective material to the housing;

removing a sacrificial material from within the housing through the at least one aperture;

depositing the protective material adjacent at least a portion of the housing, wherein the protective material at least flows into the at least one aperture, sealing the at least one aperture in an amount sufficient to substantially close the at least one aperture the protective material being deposited on the device or any substrate underlying the housing~~without entering the housing sufficiently to interfere with operation of the at least one movable region of the device~~; and

curing the protective material.

70. (Currently Amended) A method for packaging a device, the method comprising:

forming a housing over the device, the housing having at least one aperture;

forming the shape and size of the at least one aperture, such that a removing material is able to pass through the at least one aperture but a protective material having a first viscosity cannot pass flow through the at least one aperture and be deposited on the device or any substrate underlying the housing during an application of the protective material to the housing; and

removing a sacrificial material from within the housing through the at least one aperture.

71. (Canceled)

72. (Previously Presented) The method of Claim 70 wherein the step of removing a sacrificial material comprises at least one selected from the list consisting of:
sputter etching, ion beam milling, chemical etching, plasma ashing, and plasma etching.

73. (Previously Presented) The method of Claim 70 further comprising:
depositing the protective material adjacent to the housing.

74. (Previously Presented) The method of Claim 70 further comprising:
providing a gas atmosphere about the device, wherein the pressure is greater than or equal to 1 Pascal (Pa); and
providing a temperature about the device of less than 600° Celsius (C).

75. (Previously Presented) The method of Claim 70 further comprising:
depositing a layer of structural material about the device, wherein the structural material has a lower etch rate than the sacrificial material.

76. (Previously Presented) The method of Claim 70 further comprising:
depositing a layer of sacrificial material about the device, wherein the sacrificial material comprises at least one selected from the list consisting of:
a photoresist and a polyimide material.

77. (Previously Presented) The method of Claim 70 further comprising:
depositing a layer of conductive material.

78. (Previously Presented) The method of Claim 77 wherein the step of depositing a layer of conductive material comprises depositing a protective material adjacent to the housing.

79. (Previously Presented) The method of Claim 70 wherein the step of forming the shape and size of the at least one aperture comprises determining a shape and size for the at least one aperture such that a surface tension of the removing material enables the removing material to pass through at least one of the one or more apertures but a surface tension of the covering material prevents the covering material from passing through the one or more apertures.

80. (Currently Amended) A method for packaging a device, the method comprising:
covering the device with a sacrificial material;
covering the sacrificial material with a housing of structural material;
determining a shape and size for an aperture such that a removing material, having a first viscosity, is able to pass through the aperture but a liquid protective material, having a second viscosity, cannot pass through the aperture during an application of the protective material to the housing;
creating, in the housing, one or more apertures having the determined size and shape; and
removing a sacrificial material from within the housing through the one or more apertures.

81. (New) The method of Claim 1, further comprising depositing additional material adjacent to the protective material.

82. (New) The method of Claim 81, further comprising curing the additional material.

83. (New) The method of Claim 82, wherein the additional material increases hermeticity of the housing.

84. (New) The method of Claim 2, wherein the gas atmosphere comprises a gas selected from the group consisting of argon, nitrogen, helium, neon, and air.

85. (New) The method of Claim 2, wherein the gas atmosphere comprises a gas having relative humidity below 5%.

86. (New) The method of Claim 85, wherein the gas comprises air.

87. (New) The method of Claim 1, further comprising adjusting a first viscosity of the protective material to a second viscosity so that the protective material does not deposit on the device or any substrate.